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REMARKS

This response is intended as a full and complete response to the Final Office Action dated November 23, 2004. In view of the following discussion, the Applicants believe that all claims are in allowable form.

CLAIM REJECTIONS

I. 35 U.S.C. §112 Claims 1-5, 9-15, and 21-25

Claims 1-5, 9-15, and 21-25 stand rejected under 35 U.S.C. §112. The Applicants respectfully disagree.

The Examiner asserts that there is no support for the limitations "wherein said core material contacts said semiconductor layer along a side of said opening." However, Figures 4a-4f and the accompanying text disclose a method of making an optical waveguide wherein the core material may directly contact the sides of the semiconductor layer. (*Application*, p. 6, ll. 1-14; Figs. 4a – 4f.) Specifically, the Application discloses that the additional layer 42 is optional. (*Application*, p. 6, ll. 8-10.) As such, the layer 42 depicted in Figures 4c – 4f may be ignored for embodiments where the optional layer 42 is not utilized. With the optional layer 42 not present, the core material 46 contacts the semiconductor layer 40 along a side of the opening 44. (*Application*, Figs. 4c – 4f.)

Thus, the Applicants submit that claims 1-5, 9-15, and 21-25 are in allowable form. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims allowed.

II. 35 U.S.C. §102

A. 35 U.S.C. §102(e) Claims 1-3

Claims 1-3 stand rejected as being anticipated by United States Patent No. 6,307,242, issued October 23, 2001, to Sugiyama (hereinafter Sugiyama). The Applicants respectfully disagree.

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Independent claim 1 recites limitations not taught or suggested by *Sugiyama*. *Sugiyama* does not teach or suggest depositing a core material on said first insulating layer to fill said opening, wherein said core material contacts said semiconductor layer along a side of said opening, as recited by claim 1. *Sugiyama* discloses a method of manufacturing a semiconductor photodetector having a square-shaped optical waveguide with respect to Figures 4A-C and 5A-C. *Sugiyama* teaches etching an opening in a silicon layer 12 as shown in Figures 4A and 4B. (*Sugiyama*, col. 5, l. 54-col. 6, l. 3; Figs. 4A-B.) However, *Sugiyama* further teaches depositing a germanium layer 13 on the sidewall of the opening in the silicon layer 12 and a P+ type silicon layer 17 on top of the germanium layer 13 prior to depositing P+ type polysilicon 11 into the opening. (*Sugiyama*, col. 6, ll. 4-14; Figs. 4C, 5A.) As such, the polysilicon 11 does not contact the silicon layer 12 along a side of the opening.

In the Final Office Action, the Examiner asserts that *Sugiyama* teaches a compound semiconductor layer (elements 12, 13, and 17) disposed on a first insulating layer and forming an opening through the semiconductor layer. (Final Office Action, p. 3, ll. 14-16.) However, as discussed above, *Sugiyama* does not form an opening through a compound semiconductor layer as cited by the Examiner because the opening in *Sugiyama* is formed only in the layer 12. Moreover, *Sugiyama* teaches depositing polysilicon 11 only after depositing two other layers of material (13, 17) onto the sidewalls of the opening in the layer 12. As such, the polysilicon 11 does not touch the layer in which the opening was formed (i.e., the silicon layer 12) because of the intervening deposited layers 13 and 17 on the sidewalls of the opening. Therefore, *Sugiyama* does not teach or suggest forming an opening through a semiconductor layer to a first insulating layer and depositing a core material on the first insulating layer to fill the opening, wherein the core material contacts the semiconductor layer along a side of the opening, as recited in claim 1.

Thus, the Applicants submit that claims 1-3 are patentable over *Sugiyama*. Accordingly, the Applicants respectfully request the rejection be withdrawn and the claims allowed.

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III. 35 U.S.C. §103(a)

A. Claims 1-4, 13, and 21

Claims 1-4, 13, and 21 stand rejected as being unpatentable over *Sugiyama* in view of United States Patent No. 6,553,170, issued April 22, 2002, to *Zhong et al.* (hereinafter *Zhong*). The Applicants respectfully disagree.

As discussed above, claim 1 recites limitations not taught or suggested by *Sugiyama*. In addition, independent claim 21 recites limitations similar to those in claim 1 that are not taught or suggested by *Sugiyama*. *Zhong* discloses a method of forming an optical waveguide by etching away core material deposited on an upper surface of a substrate and subsequently covering the core material and substrate with a top cladding layer. (*Zhong*, col. 4, l. 65 – col. 5, l. 10.) Thus, *Zhong* fails to teach or suggest a modification to the fabrication method of *Sugiyama* wherein said core material contacts said semiconductor layer along a side of said opening, as recited by claims 1 and 21. As such, a *prima facie* case of obviousness has not been established since the combination of the cited art fails to teach or suggest all of the limitations recited in claims 1 and 21.

Moreover, *Sugiyama* requires the presence of a Si/SiGe layer or a Ge layer as a light absorption layer on both walls of the optical waveguide. (*Sugiyama*, col. 4, ll. 36-47.) Thus, *Sugiyama* cannot be modified in a manner that would yield the invention as recited in claims 1 and 21, as any such modification would render *Sugiyama* unsuitable for its intended purpose.

Thus, the Applicants submit that claims 1-4, 13, and 21 are patentable over *Sugiyama* in view of *Zhong*. Accordingly, the Applicants respectfully request the rejection be withdrawn and the claims allowed.

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B. Claim 14

Claim 14 stands rejected as being unpatentable over *Sugiyama* in view of *Zhong* and further in view of United States Patent No. 3,934,061, issued January 20, 1976, to *Keck et al.* (hereinafter *Keck*). The Applicants respectfully disagree.

As discussed above, claim 1, from which claim 14 depends, recites limitations not taught or suggested by *Sugiyama* alone or *Sugiyama* in view of *Zhong*. As also discussed above, *Sugiyama* may not be modified in a manner that would yield the invention as recited in claim 1, as any such modification would render *Sugiyama* unsuitable for its intended purpose.

Moreover, *Keck* fails to teach or suggest depositing a core material on said first insulating layer to fill said opening, wherein said core material contacts said semiconductor layer along a side of said opening, as recited by claim 1. Thus, *Keck* cannot be used to modify *Sugiyama* or *Sugiyama* in view of *Zhong* in a manner that would yield the invention as recited in claim 1. As such, a *prima facie* case of obviousness has not been established since the combination of the cited art fails to teach or suggest all of the limitations recited in claim 1.

Thus, the Applicants submit that claim 14 is patentable over *Sugiyama* in view of *Zhong* and further in view of *Keck*. Accordingly, the Applicants respectfully request the rejection be withdrawn and the claim allowed.

C. Claim 5

Claim 5 stands rejected as being unpatentable over *Sugiyama* in view of United States Patent No. 6,282,358, issued August 28, 2001, to *Hombeck et al.* (hereinafter *Hombeck*). The Applicants respectfully disagree.

As discussed above, claim 1, from which claim 5 depends, recites limitations not taught or suggested by *Sugiyama*. As also discussed above, *Sugiyama* may not be modified in a manner that would yield the invention as recited in claim 1, as any such modification would render *Sugiyama* unsuitable for its intended purpose.

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Moreover, *Hombeck* fails to teach or suggest depositing a core material on said first insulating layer to fill said opening, wherein said core material contacts said semiconductor layer along a side of said opening, as recited by claim 1. Thus, *Hombeck* cannot be used to modify *Sugiyama* in a manner that would yield the invention as recited in claim 1. As such, a *prima facie* case of obviousness has not been established since the combination of the cited art fails to teach or suggest all of the limitations recited in claim 1.

Thus, the Applicants submit that claim 5 is patentable over *Sugiyama* in view of *Hombeck*. Accordingly, the Applicants respectfully request the rejection be withdrawn and the claim allowed.

D. Claims 9-12, 15, and 22-25

Claims 9-12, 15, and 22-25 stand rejected as being unpatentable over *Sugiyama*. The Applicants respectfully disagree.

As discussed above, claim 1, from which claims 9-12 and 15 depend, recites limitations not taught or suggested by *Sugiyama*. As also discussed above, *Sugiyama* may not be modified in a manner that would yield the invention as recited in claim 1, as any such modification would render *Sugiyama* unsuitable for its intended purpose.

Independent claims 22-25 each recite depositing a core material on said first insulating layer to fill said opening, wherein said core material contacts said semiconductor layer along a side of said opening. As such, claims 22-25 each recite limitations not taught or suggested by *Sugiyama*. In addition, as discussed above with respect to claim 1, *Sugiyama* may not be modified in a manner that would yield the invention as recited in any of claims 22-25, as any such modification would render *Sugiyama* unsuitable for its intended purpose.

As such, a *prima facie* case of obviousness has not been established since the *Sugiyama* in combination with the ordinary skill in the art fails to teach or suggest all of the limitations recited in claims 1 and 22-25.

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Thus, the Applicants submit that claims 9-12, 15, and 22-25 are patentable over Sugiyama. Accordingly, the Applicants respectfully request the rejection be withdrawn and the claims allowed.

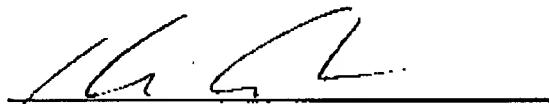
CONCLUSION

Thus, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both reconsideration of this application and swift passage to issue are earnestly solicited.

If the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Keith Taboada at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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